CLAIMS

1. A method for forming a textured planarizing pad for planarizing a microelectronic substrate, comprising:

separating a planarizing pad material into discrete elements; and

disposing the discrete elements on a support material with portions of the discrete elements spaced apart from each other and projecting from the support material and with the discrete elements configured to engage the microelectronic substrate and remove material from the microelectronic substrate.

2. The method of claim 1, further comprising distributing a plurality of abrasive particles in the planarizing pad material before separating the planarizing pad material into discrete elements, and wherein the discrete elements include at least some of the abrasive particles in the discrete elements.

3. The method of claim 2 wherein the support material has a first surface and a second surface opposite the first surface, further comprising distributing the abrasive particles to occupy from about 5% to about 50% of a surface area of the first surface of the support material.

4. The method of claim 1 wherein at least a portion of the planarizing pad material is in a liquid phase and separating the planarizing pad material includes mixing the planarizing pad material with a stream of gas and forming discrete droplets of the planarizing pad material.

5. The method of claim 1, further comprising reducing a viscosity of the planarizing pad material by adding a solvent to the planarizing pad material before separating the planarizing pad material into discrete elements.

6. The method of claim 1 wherein separating the planarizing pad material includes separating the planarizing pad material into droplets when the

planarizing pad material is in a liquid state, and further comprising at least partially solidifying the droplets before disposing the droplets on the support material.

7. The method of claim 1 wherein separating the planarizing pad material includes forming partially spherical droplets of the planarizing pad material.

8. The method of claim 1, further comprising forming the discrete elements to have a cross-sectional dimension of from approximately 50 microns to approximately 200 microns when the discrete elements are on the support material.

9. The method of claim 1, further comprising disposing the discrete elements on the surface of the support material to project from the surface of the support material by a distance of from about 10 microns to about 200 microns.

10. The method of claim 1, further comprising curing the discrete elements and the support material after the discrete elements are disposed on the support material.

11. The method of claim 1, further comprising selecting the planarizing pad material to include a thermoset or a thermoplastic material.

12. The method of claim 1, further comprising forming the discrete elements to have an upper surface spaced apart from the surface of the support material with the upper surface having blunt or rounded edges.

13. The method of claim 1 wherein disposing the discrete elements includes passing the discrete elements through an orifice toward the support material.

14. The method of claim 13, further comprising moving at least one of the orifice and the support material relative to the other to distribute the discrete elements over the support material.

15. The method of claim 1, further comprising passing the discrete elements through apertures of a grate to control the distribution of the discrete elements on the support material.

16. The method of claim 1 wherein disposing the discrete elements on the support material includes accelerating the discrete elements through an orifice.

17. The method of claim 1 wherein disposing the discrete elements on the support material includes dropping the discrete elements onto the support material from above.

18. The method of claim 1 wherein the support material is elongated in a longitudinal direction, further comprising disposing the planarizing pad material on the support material through a plurality of orifices arranged in a first row extending transverse to the longitudinal direction and a second row extending transverse to the longitudinal direction and offset in the longitudinal direction from the first row with orifices of the first row being offset transversely from orifices of the second row.

19. The method of claim 1, further comprising selecting the support material to be elongated along a longitudinal axis.

20. The method of claim 1, further comprising selecting the support material to have a generally circular planform shape.

21. The method of claim 1 wherein the support material includes an adhesive portion, and further wherein disposing the discrete elements includes placing the discrete elements on the adhesive portion.

22. The method of claim 1, further comprising at least partially curing the discrete elements before disposing the discrete elements on the support material.

23. The method of claim 1, further comprising adding a selected chemical agent to the planarizing pad material before separating the planarizing pad material into discrete elements, the chemical agent being selected to control polishing characteristics of a microelectronic substrate when the microelectronic substrate is engaged with the planarizing pad and at least one of the microelectronic substrate and the planarizing pad is moved relative to the other.

24. The method of claim 23, further comprising selecting the chemical agent to include a surfactant, oxidizer, inhibitor and/or pH control agent.

25. The method of claim 1, further comprising distributing the discrete elements to have a first spacing in a first portion of the support material and a second spacing in a second portion of the support material with the first spacing different than the second spacing.

26. The method of claim 1 wherein disposing the discrete elements includes forming a jet of discrete elements and directing the jet toward the surface of the support material.

27. The method of claim 1, further comprising selecting the support material and the planarizing pad material to have the same chemical composition.

28. The method of claim 1, further comprising surrounding the discrete elements and the support material with an inert gas while disposing the discrete elements on the support material.

29. A method for forming a textured planarizing pad for planarizing a microelectronic substrate, comprising:

distributing a plurality of abrasive elements in a liquid planarizing pad material;

mixing the liquid planarizing pad material with a gas stream to form a jet of pad material droplets;

directing the jet of pad material droplets toward a support material;

distributing the pad material droplets over the support material by moving at least one of the support material and the jet relative to the other; and

solidifying the pad material droplets and securing the pad material droplets to the support surface of the support material by curing the pad material droplets and the support material.

30. The method of claim 29, further comprising reducing a viscosity of the planarizing pad material by adding a solvent to the planarizing pad material before separating the planarizing pad material into discrete elements.

31. The method of claim 29 wherein mixing the liquid planarizing pad material includes forming partially spherical droplets of the planarizing pad material.

32. The method of claim 29, further comprising selecting the pad material droplets to have a cross-sectional dimension of from approximately 50 microns to approximately 200 microns when the droplets are on the support material.

33. The method of claim 29, further comprising selecting the pad material droplets on the surface of the support material to project from the surface of the support material by a distance of from about 10 microns to about 200 microns.

34. The method of claim 29, further comprising distributing the abrasive elements in the planarizing pad material and distributing the pad material droplets over the support material so that the abrasive elements cover from approximately 5% to approximately 50% of a surface area of the support material.

35. The method of claim 34, further comprising distributing the abrasive elements in the planarizing pad material and distributing the pad material droplets over

the support material so that the abrasive elements cover approximately 20% of a surface area of the support material.

36. The method of claim 29 wherein disposing the pad material droplets on the support material includes dropping the pad material droplets onto the support material from above.

37. The method of claim 29, further comprising selecting the support material and the planarizing pad material to have the same composition.

38. A method for forming a textured planarizing pad for planarizing a microelectronic substrate, comprising:

providing a support material having a first surface and a second surface opposite the first surface; and

forming texture elements at least proximate to the first surface of the support material without engaging a mold or die with the support material, at least a portion of the texture elements spaced apart from each other with the texture elements having a raised portion configured to engage a microelectronic substrate and remove material from the microelectronic substrate when at least one of the texture elements and the microelectronic substrate is moved relative to the other.

39. The method of claim 38, further comprising separating the planarizing pad material into discrete elements and disposing the discrete elements on the support material.

40. The method of claim 39, further comprising distributing a plurality of abrasive particles in the planarizing pad material before separating the planarizing pad material into discrete elements, further wherein separating the planarizing pad material into discrete elements includes distributing at least some of the abrasive particles in the discrete elements.

41. The method of claim 39 wherein at least a portion of the planarizing pad material is in a liquid phase and separating the planarizing pad material includes mixing the planarizing pad material with a stream of gas and forming discrete droplets of the planarizing pad material.

42. The method of claim 39 wherein separating the planarizing pad material includes separating the planarizing pad material into droplets when the planarizing pad material is in a liquid state, further comprising at least partially solidifying the droplets before disposing the droplets on the support material.

43. The method of claim 39, further comprising curing the discrete elements and the support material after the discrete elements are disposed on the support material.

44. The method of claim 39, further comprising selecting the texture elements and the support material to have the same composition.

45. A planarizing pad for planarizing a microelectronic substrate, comprising:

a generally planar support portion; and

a plurality of texture elements disposed on the support portion, portions of the texture elements being spaced apart from each other and projecting from the support portion, each texture element having a generally smooth upper surface, smoothly transitioning to a generally smooth side surface without asperities.

46. The planarizing pad of claim 45 wherein the texture elements have a plurality of abrasive particles embedded therein.

47. The planarizing pad of claim 45 wherein the texture elements include partially spherical droplets.

48. The planarizing pad of claim 45 wherein the texture elements have a cross-sectional dimension of from approximately 50 microns to approximately 200 microns.

49. The apparatus of claim 45 wherein the texture elements project from the support portion by a distance of from about 10 microns to about 200 microns.

50. The planarizing pad of claim 45 wherein the support portion is elongated in a longitudinal direction.

51. The planarizing pad of claim 45 wherein the support portion has a generally circular planform shape.

52. The planarizing pad of claim 45 wherein the support portion includes a support material, further comprising an adhesive material between the support material and the texture elements.

53. The planarizing pad of claim 45, further comprising a selected chemical agent embedded in the texture elements.

54. The planarizing pad of claim 53 wherein the selected chemical agent includes a surfactant or an oxidizer.

55. The planarizing pad claim 45 wherein the texture elements have a first spacing in a first region of the support portion and a second spacing in a second region of the support material with the first spacing different than the second spacing.

56. The planarizing pad of claim 45 wherein the texture elements and the support portion have the same chemical composition.

57. A planarizing pad for planarizing a microelectronic substrate, comprising:

a support portion; and

a plurality of discrete texture elements disposed on the support portion, the texture elements being initially separate from the support portion and subsequently bonded to the support portion with portions of the texture elements being spaced apart from each other and projecting from the support portion, each texture element having a generally smooth upper surface.

58. The planarizing pad of claim 57 wherein the texture elements have a plurality of abrasive particles embedded therein.

59. The planarizing pad of claim 57 wherein the texture elements include partially spherical droplets.

60. The planarizing pad of claim 57 wherein the texture elements have a cross-sectional dimension of from approximately 50 microns to approximately 200 microns.

61. The planarizing pad of claim 57 wherein the texture elements project from the surface of the support material by a distance of from about 10 microns to about 200 microns.

62. The planarizing pad of claim 57 wherein the support portion includes a support material, further comprising an adhesive material between the support material and the texture elements.

63. The planarizing pad of claim 57, further comprising a selected chemical agent embedded in the texture elements.

64. The planarizing pad of claim 57 wherein the texture elements have a first spacing in a first region of the support portion and a second spacing in a second region of the support portion with the first spacing different than the second spacing.

65. The planarizing pad of claim 57 wherein the texture elements and the support portion have the same chemical composition.

66. An apparatus for forming a planarizing pad for mechanically and/or chemically-mechanically planarizing a microelectronic substrate, comprising:

a support device configured to support a pad support material in a selected position;

a vessel configured to contain a non-solid planarizing pad material; and

at least one nozzle operatively coupled to the vessel and coupled to a source of compressed gas, the nozzle configured to mix the planarizing pad material with the compressed gas to form discrete texture elements for disposing on the support material.

67. The apparatus of claim 66 wherein the support device includes first and second rollers coupled to the support material and rotatable relative to each other to advance the support material from the first roller to the second roller.

68. The apparatus of claim 66, further comprising a hopper positioned between the nozzle and the support device, the hopper having a first opening positioned proximate to the at least one nozzle and a second opening proximate to the support material when the support material is supported by the support device.

69. The apparatus of claim 66 wherein the support material is elongated in a longitudinal direction and the at least one nozzle is the first of two nozzles coupled to the vessel, the second nozzle being offset in the longitudinal direction and in a lateral direction transverse to the longitudinal direction relative to the first nozzle.

70. The apparatus of claim 69, further comprising:

a manifold coupled to the vessel;

a first spraybar coupled to the manifold and extending over the support material in transverse direction when the support material is supported by the support device, the first nozzle being connected to the first spraybar; and

a second spraybar coupled to the manifold and spaced apart from the first spraybar in the longitudinal direction, the second spraybar extending transversely over the support material when the support material is supported by the support device, the second nozzle being connected to the second spraybar.

71. The apparatus of claim 66, further comprising a heating element positioned proximate to the support device and proximate to the pad support material when the pad support material is supported by the support device.

72. The apparatus of claim 66, further comprising a grate between the nozzle and the support device, the grate having a plurality of apertures sized to pass the discrete texture elements therethrough.